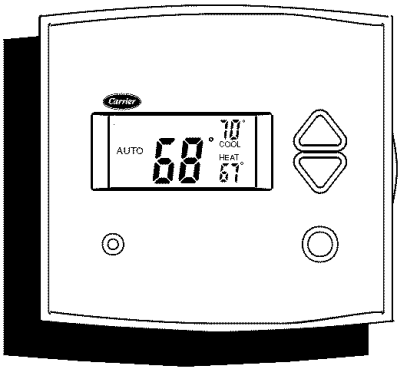
Installation Instructions

DIGITAL THERMOSTAT 53DFS250-SL

Cooling Only, Heat Cool, and Heat Pump



MULTI-STAGE • SEVEN DAY PROGRAMMABLE

Table of Contents

STEP #1 PREPARATION	1
STEP #2 WIRE CONNECTIONS	1
SAMPLE WIRING DIAGRAMS	2
STEP #3 TEST OPERATION	2
ADVANCED SETUP	2
ABOUT ADVANCED FEATURES AND OPERATION	3
TROUBLESHOOTING	5
CALIBRATION	5

IMPORTANT: Follow *Installation Instructions* carefully.

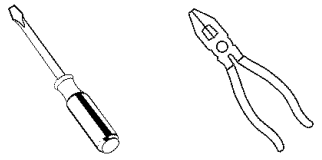
⚠ **CAUTION:** DISCONNECT POWER TO THE SYSTEM BEFORE INSTALLING THE NEW THERMOSTAT. SERIOUS PERSONAL INJURY MAY RESULT.

This device complies with Part 15 of the FCC rules. Operation is subject to the following 2 conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

STEP #1 PREPARATION

A. Proper installation of the thermostat will be accomplished by following these step by step instructions. If you are unsure about any of these steps, call a qualified technician for assistance.

B. Assemble tools:



Flat Blade Screwdriver *Wire Cutter and Stripper*

C. Carefully unpack the thermostat. Save the screws, bracket, and instructions.

D. Turn off the power to the system at the main fuse panel. Most systems have a separate breaker for disconnecting power to the indoor and outdoor units.

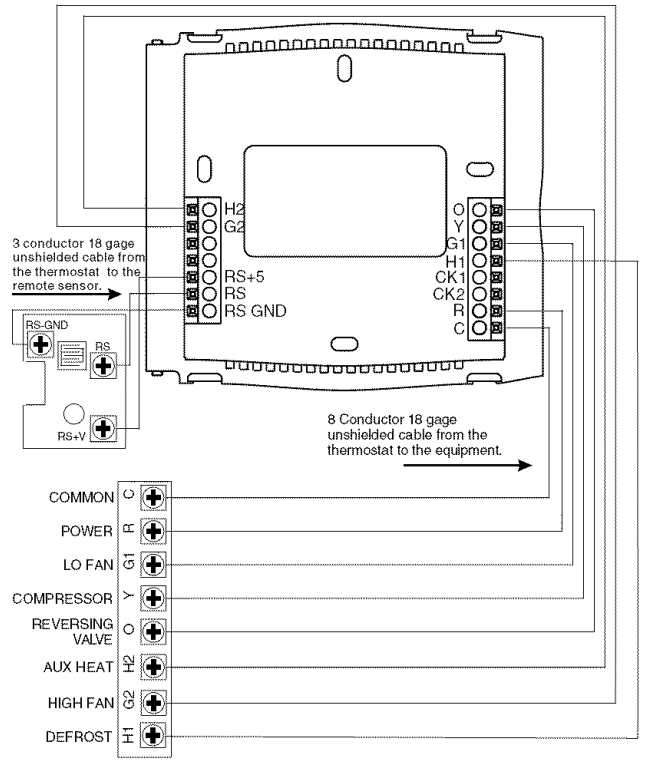
STEP #2 WIRE CONNECTIONS

Refer to the chart below, or the wiring diagrams that follow for thermostat functions and corresponding thermostat connectors.

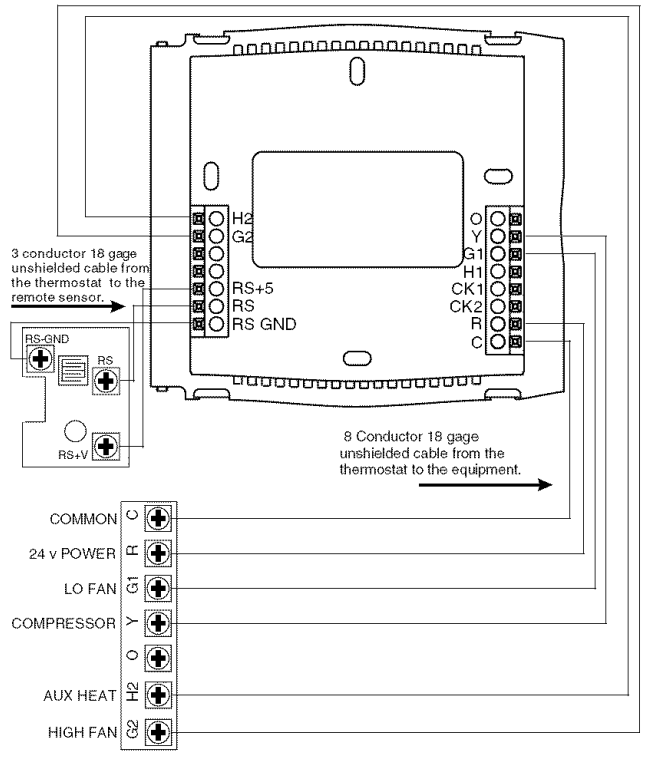
FUNCTION	INSTALL ON THE NEW THERMOSTAT CONNECTOR MARKED
Lo Fan	G1
Compressor	Y
Heating	H2
24 v Power	R
Common	C
Rev. Valve	O*
Hi Fan	G2
Remote Sensor +5vdc	RS+5
Remote Sensor Signal	RS
Remote Sensor Ground	RS GND
Dry Contact Switch 1	CK1
Dry Contact Switch 2	CK2
Defrost	H1

*Only used with Heat Pump systems.

Sample Wiring Diagrams — HEAT PUMP



Sample Wiring Diagrams — HEAT-COOL/ COOLING ONLY



NOTE: For cooling only the H2 connection is not required.

STEP #3 — TEST OPERATION

A. Turn the power on to the HVAC (heating, ventilation, and air conditioning) system.

B. Press the Mode button until the **HEAT** icon appears on the display. Press the Up or Down buttons until the set temperature is 10 degrees **above** room temperature. The unit will turn on and supply heat.

C. Press the Mode button until the **COOL** icon appears on the display. Press the Up or Down buttons until the set temperature is 10 degrees **below** room temperature. The unit will turn on.

NOTE: Most equipment has a time delay between cycles. This feature is defeatable on the thermostat. See the Advanced Setup section.

D. Press the Mode button repeatedly until **OFF** is displayed on the thermostat.

Advanced Setup

Follow the steps below to complete Advanced Setup, which begins with Step 3. Refer to the Owner's Manual to complete Setup Steps 1 and 2.

MODE

PROGRAM

Press the Mode button. While holding the Mode button, press the Program button to enter the Advanced Setup screens.

NOTE: Each step number is located at the top right corner of the display for easy reference.

On

Select residential Heat Pump, On or Off.

Off

Setup 3 — OFF HP

Adjust the deadband from 1 to 6 degrees.

(1 to 6 F)

Setup 4 — db 2

Adjust the minimum ***difference*** between cooling and heating set points.

(0 to 6 F)

Setup 5 — dIF 2

Select the cycles per hour limit.
d=cycles per hour limit defeated.
d1=d + defeat 5 min. Compressor lockout.

(d, d1, 2 - 6)

Setup 6 — 6 CY

Select the security level:
0=no security in effect
1=set point range limited
2=1+ program on all times
3=2 + prohibits set point changes

Setup 7 — SEC 3 Locked

Adjust the maximum allowable heat set point when security is in effect.
*(Step 8 only appears if Step 7 is not **0**).*

(35 - 99 F)

Setup 8 — HI 80 Locked

Adjust the minimum allowable cool set point when security is in effect.
*(Step 9 only appears if Step 7 is not **0**).*

(35 - 99 F)

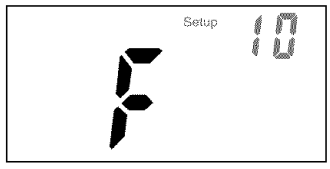
Setup 9 — LO 65 Locked

Advanced Setup (cont)

C

Select thermostat operation in degrees Fahrenheit or Celsius.

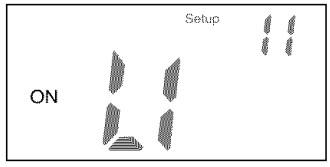
F



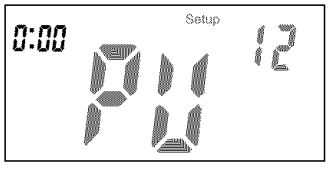
On

Select the display backlight always **On**, or **Off** after 8 seconds.

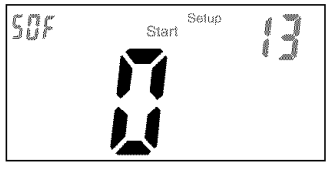
Off



Adjust the preoccupancy fan purge timer.
0 - 3 hours.
0:00 = off



Select the unit ID for 'Soft Start'. This is used in multiple installs to stagger equipment turn on times. 0 = off. Each Number = (30 seconds) second delay.
(0 to 99)



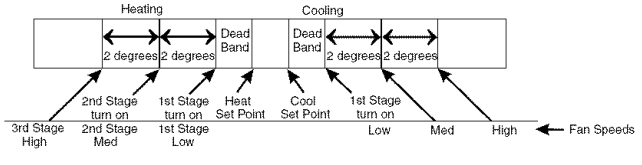
Press the Mode button. While holding the Mode, press the Program button to leave the Setup screens. If no buttons are pressed, the display will leave the setup screens after 30 seconds.

Advanced Setup Table

STEP NO.	DESCRIPTION	RANGE	FACTORY DEFAULT
1	Time of day clock set	24 hour	12:00 Am
2	Day of the week	Su - Sa	Mo
3	Heat Pump	Off / On	Off
4	Deadband or Temperature swing	1 - 6 F	2 F
5	Forced minimum difference heat/ cool	0 - 6 F	2 F
6	Cycles per hour	d, d1, 2 - 6	6
7	Security Levels	0 - 3	0
8	Maximum allowable Heat set point	35 - 99 F	80 F
9	Minimum allowable Cool set point	35 - 99 F	65 F
10	Fahrenheit or Celsius	F / C	F
11	Thermoglow™ backlight	Off / On	On
12	Fan Purge timer	0:00 - 3:00 min.	0:00 min.
13	Soft Start	0 - 99	0

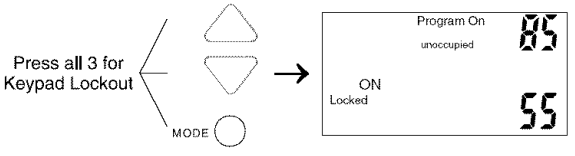
About Advanced Features and Operation

- TWO-STAGE OPERATION — The second stage of heat (heat pump models only) is turned on when (**1**) the first Stage has been on for a minimum of two minutes, **and** (**2**) the temperature spread from the set point is equal to or greater than: *the set point temperature plus the deadband, plus 2 degrees.*



- MINIMUM HEAT/COOL SET POINT DIFFERENCE — The Heat and Cool set point temperature will not be allowed to come any closer to each other than the value set in Advanced Setup *Step 5, on page 2.* This minimum difference is enforced during Auto changeover and Program On operation.
- ENERGY SAVING SMART FAN — If Fan On is selected, the fan will run continuously at all times, except in Off, **and** will only run if there is a heating or cooling demand in Unoccupied periods.
- OVERRIDE — Press the Override button during a programmed, Unoccupied period to force the thermostat into the Occupied 1 period, temporarily, up to 4 hours. If the Override button is pressed during an Occupied period, the thermostat will be forced into the Unoccupied period and the occupied number *(1,2 or 3)*, it was forced out of will be turned off, only for that day.

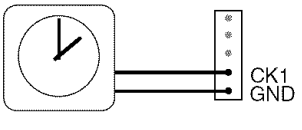
  During Override periods the set point temperature may be adjusted, but it will not be remembered after Override ends.
- HEAT — First Stage = Heat Pump. Second Stage = Heat Pump and Electric Heat.
- FAN PURGE TIMER — When this feature is activated, the fan will turn on during the Unoccupied period at a preset amount of time prior to the Occupied 1 period. This preoccupancy fan purge timer may be set as instructed on *this page, Step 12*, from 0 to 3 hours. 0 = this feature turned off.
- KEYPAD LOCK — To prevent unauthorized use of the thermostat, the front panel buttons may be disabled. To disable, or 'lock' the keypad, press and hold in the Mode button. While holding the Mode button in, press the Up and Down buttons in together. The **Locked** icon will appear on the display.



To ***unlock*** the buttons, again press and hold the Mode button. While holding the Mode button in, press the Up and Down buttons in together. The **Locked** icon will disappear from the display.

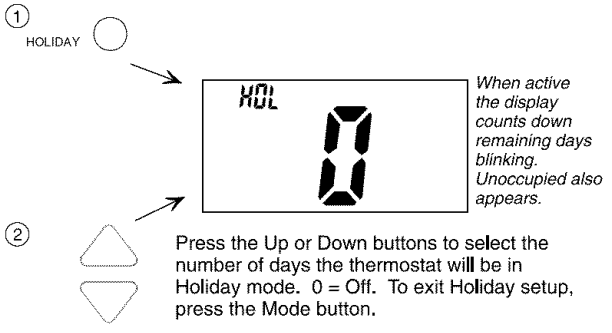
- DRY CONTACT SWITCH — The terminals are 'normally open.' Closing or completing the circuit will cause the thermostat to enter the Occupied 1 period. This feature allows an external device such as a central time clock, occupancy sensor, or a telephone-activated device to force one or more thermostats into the Occupied 1 period. For the dry contact switch to work, the thermostat must be in **Program On**. *Set Occupied 1 to Off for all 7 days,* so the contact closure will be in control. When the thermostat is forced into the Occupied 1 period via the Dry Contact closure, the icon **Occupied 1** will blink.

IMPORTANT: For control of multiple thermostats by one source, refer to Potential Phasing Problems (document part no. 88-173) prior to installing.



About Advanced Features and Operation

- HOLIDAY MODE — This feature forces the thermostat into Unoccupied for a preset duration, up to 99 days. The Holiday setup display is entered as follows:


①
HOLIDAY
HOL
0
When active the display counts down remaining days blinking. Unoccupied also appears.
②
Press the Up or Down buttons to select the number of days the thermostat will be in Holiday mode. 0 = Off. To exit Holiday setup, press the Mode button.

  The thermostat will enter the Holiday mode when the clock crosses midnight.

  During Holiday mode Unoccupied period set points are enforced.

  The Override button is active during Holiday mode. It will override to the Occupied 1 period settings up to 4 hours then return to Holiday mode. The dry contact switch is ignored.

  The thermostat will exit Holiday mode at midnight of the final programmed day. To terminate the Holiday mode immediately, enter the Holiday mode setup screen and select 0.

- SOFT START — This feature is utilized in multiple thermostat installations controlled by the dry contact terminals. Assigning a unique soft start number to each thermostat will stagger the turn on times, even though the dry contact closes, for all the thermostats connected, at the same time. Each soft start number represents a multiple of 30 seconds from the dry contact closure. For example, no. 1 = turn on 30 seconds after dry contact closure, no. 2 = turn on 60 seconds after closure, no. 3 = turn on 90 seconds after closure, and so on. See *page 3, Step 13,* to configure the thermostat for Soft Start.

- DUAL SET POINT BEHAVIOR — The adjustable set point range is: 35 to 99 degrees in Fahrenheit and 7 to 35 degrees in Celsius. When in the modes Heat or Cool, this adjustable range is unhampered.

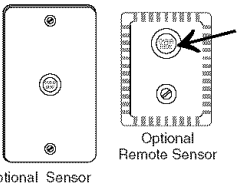
  When adjusting any Auto mode, including programming Occupied and Unoccupied set points, the thermostat will not allow the Heat set point to get closer to the Cool set point than the value programmed as the minimum difference in *Step 5, page 2.*

  When entering the Auto mode from Cool, the Heat and Cool set points will remain spread apart by the amount that they were adjusted, prior to entering Auto mode.

  For example: If the Cool set point was set to 80 F while in the Cool mode and the Heat set point was adjusted to 70 F while in the Heat mode, upon entering the Auto mode the Heat and Cool set points would be 80 F and 70 F. **Both** set point temperatures would then move up and down together, (in this example spread by 10 degrees), by pressing the up or down buttons.

  To move the Heat and Cool set point temperatures closer together, enter the Cool or Heat mode by pressing the Mode button, then adjust the set point temperatures closer together. Heat is limited to how close it can come to Cool by *Step 5, page 2.*

- REMOTE SENSORS **(Optional Accessory)** — When connected to terminals RS+5, RS, and GND on the back of the thermostat, the thermostat will read the temperature from the remote sensor and ignore the temperature sensor inside the thermostat. The thermostat automatically recognizes when a remote sensor is connected. When reading the temperature from the remote, the degree icon above the room temperature blinks once a second.

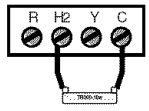
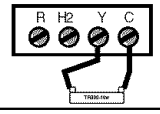


  The Override button on the remote sensor works slightly different than the Override button on the front panel. Each press of the 'External' Override button adds 2 hours to the override timer. If the timer was already active, the first button press will round the runtime to either 2:00 or 4:00.

  Subsequent button presses will not wrap around as the Override button on the thermostat does, so the second or subsequent button presses will set the runtime to 4:00. The Locked feature has no effect on the external Override button. The *wired* remote sensor is connected to the thermostat with **up to 450 ft of 22 gage, 300 ft of 20 gage or 150 ft of 18 gage thermostat wire**. *See the Remote Sensor instructions for further details.*

- FACTORY DEFAULTS — Before restoring factory defaults, set thermostat to OFF mode. If, for any reason it is desirable to return all stored settings back to the factory default settings, press the Mode button. While holding the Mode button in, press the Fan button for 5 seconds. All icons will appear. Press and hold in the Fan button until **Fd** appears. This resets all factory settings. **To calibrate room temperature,** see the Calibration section on page 5.

TROUBLESHOOTING

SYMPTOM	CAUSE	REMEDY
When not using a common wire the air conditioning equipment tries repeatedly to turn on, but cannot. At times the display dims or disappears.	There is not enough power available to "power share."	Connect a 270 ohm, 10 watt power resistor **at the unit** as shown below. *For Problem A/C*  *For Problem Heat* 
The air conditioning does not attempt to turn on.	The compressor timer lockout may prevent the air conditioner from turning on, for a period of time.	See the Advanced Setup section to defeat the cycles per hour and compressor time guard.
The display is blank.	Lack of proper power.	Check for 24 vac between R and C.
The air conditioning does not attempt to turn on.	The cooling set point is set too high.	Press the down arrow until the cooling set point is 10 degrees lower than the room temperature.
The heating does not attempt to turn on.	The heating set point is set too low.	Press the up arrow until the heating set point is 10 degrees higher than the room temperature.
The strip heater turns off well before reaching set point.	Heat pump is incorrectly selected "**on**" in the Advanced Setup.	Select heat pump "**off**" during Advanced Setup programming. See the Advanced Setup section

CALIBRATION

Every thermostat is calibrated before it leaves the factory. Under normal circumstances there will never be a need to recalibrate the thermostat again. To accommodate *special needs*, the thermostat may be recalibrated following these steps:

1. While holding the Mode button in, press the fan button in for 5 seconds. After all the icons in the display appear, release the buttons.
2. Press the Up and Down arrow buttons simultaneously, twice.
3. Press the up or down buttons until the flashing number equals the current room temperature.
4. Press the Mode button to return to normal operation.

Copyright 2005 Carrier Corporation